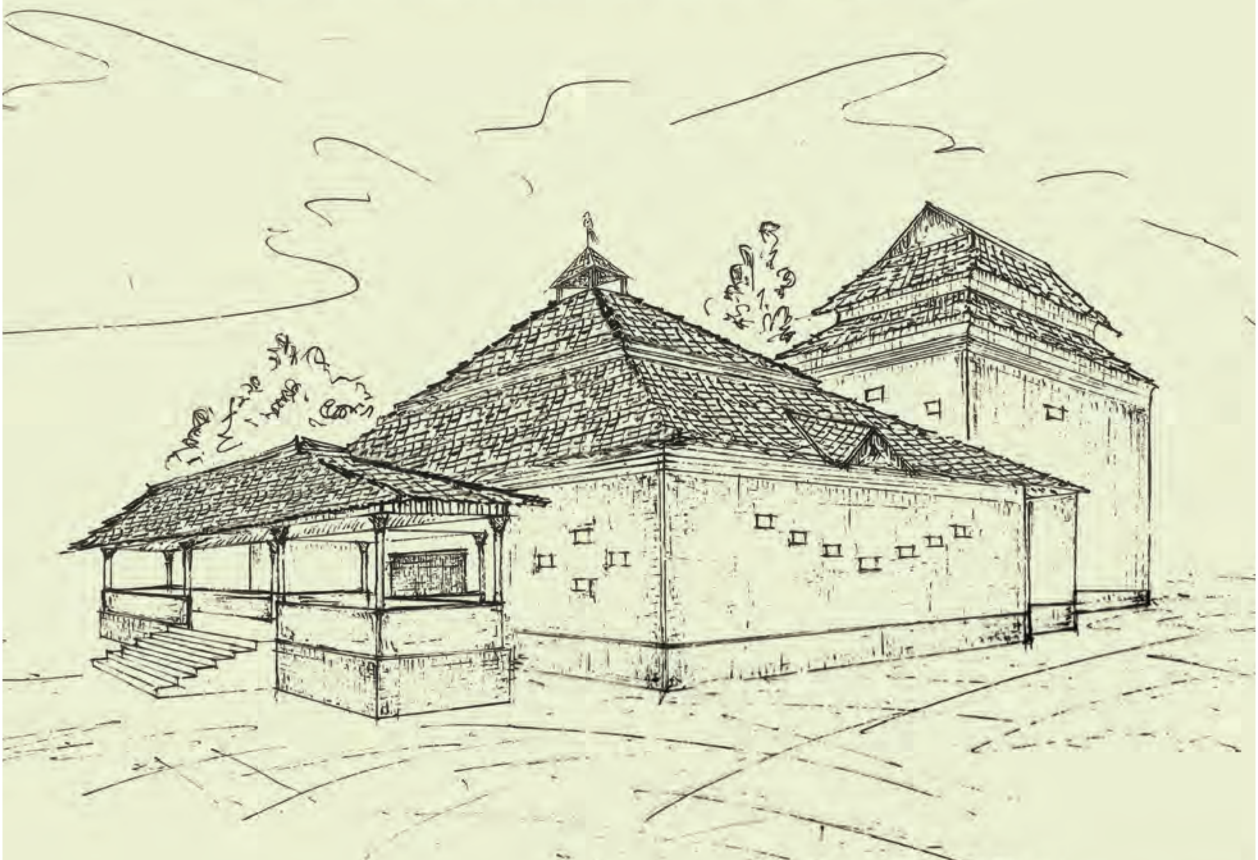
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॥ नारदशिल्पशास्त्रम् ॥

Nārada Śilpaśāstra

Sanskrit Text on Architectural Civil Engineering



R N Iyengar

K S Kannan

S Y Wakankar

Foreword by Michel Danino

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Introduction, Text, Translation and Notes

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वास्तो॑ष्पते॒ प्रति॑ जानीह्य॒स्मान्त्स्वा॑वे॒शो अ॑नमी॒वो भ॑वा नः ।
यत्त्वेम॑हे॒ प्रति॒ तन्नो॑ जुषस्व॒ शं नो॑ भव द्वि॒पदे॒ शं चतु॑ष्पदे ॥

Dedicated to the Innumerable

Ācārya, Dīkṣita, Sthapati, Sthapatibhṛtya,
Sūtragrāhaka, Takṣaka, Kāruka, Kalpanaka, Pārāvaka,
Śilpī, Vardhakī, Rathakāra, Bhittikāra, Sudhākāra,
Karmakāra, Citrakāra, Lohakāra, Ayaskāra, Svarṇakāra

For
Preserving the Heritage of
Indian Architectural Civil Engineering

Foreword

A widespread misconception about Sanskritic literature is that it is mostly concerned with philosophy, poetry, spirituality, religion, and the arts. No doubt, it did produce countless texts in those fields, some of enormous length, but to limit it to them would be doing it an injustice. Sanskrit was an instrument of expression in almost every conceivable field: grammar, poetics, architecture, agriculture, botany, zoology, medicine, chemistry, metallurgy, polity, ethics, and countless miscellaneous topics from the science of omens to the treatment of diseased crops or horse training - the list is almost endless.

Since the nineteenth century, texts of classical Indian mathematics and astronomy have at least received some attention, their contributions increasingly recognized in recent decades. Indeed, Professor R.N. Iyengar has distinguished himself with several path-breaking research papers on pre-Siddhantic astronomy, eclipses, comets and meteors, and with the landmark publication in 2013 of a reconstruction of an ancient text on astronomy and natural sciences, *Parāśaratantra*, which so far was available only through scattered extracts. Paradoxically, other scientific or technical fields remain largely unexplored, civil engineering perhaps most of all, despite its great importance.

Why is that a paradox? Because India's tangible heritage offers a loud testimony to the excellence of civil engineering skills, from the meticulous planning and execution of Harappan cities, wells, reservoirs, sanitation systems to the breath taking rock-cut structure of the Kailāsanātha temple at Ellora, the stepwells of Gujarat and Rajasthan, irrigation devices or Delhi's rust-resistant pillar. Yet texts related to town-planning, water management, construction (of buildings, roads,

wells or reservoirs), transport, and so on, are relatively few. Of course, a few manuals of *śilpaśāstra* such as *Mānasāra* or *Mayamata* have been known and discussed, but they and a few more cannot cover even a fraction of the field. Unpublished texts doubtless exist among the millions of manuscripts languishing in collections across India and abroad - this very book is proof of it - but they have not proved very attractive to Sanskrit scholars so far (and here I should include other Indian languages, since several of them also boast a rich store of manuscripts of technical texts, some of which are in current use by the Vishvakarma community, Sthapatis and other professionals). The reasons for this neglect are complex: they include no doubt the technical difficulties of the texts, requiring some expert knowledge on the part of the editor and translator, as Prof. Iyengar has highlighted in his Introduction, but perhaps also a lingering colonial prejudice that Indian civilization's significant contributions are in the spiritual field - resulting in a "top-heavy" bias, to borrow Sri Aurobindo's colourful adjective, a perspective in which the material developments of this civilization have come to be regarded as somehow "low" or unimportant. It is only in recent decades that some pride in these material achievements has returned, but it must be said much of it has been poorly or ill-informed.

The efforts by Professors Iyengar, Kannan and Wakankar in bringing out *Nārada Śilpaśāstra* are therefore highly praiseworthy and bound to elicit much scholarly interest in India and abroad. This critical edition, based on three manuscripts, comes with a careful editorial apparatus, which includes Prof. Iyengar's extensive Introduction and numerous annotations that guide the reader through the complexities of the text and the fields it deals with. Prof. Iyengar's meticulous discussion of the date and provenance of the text, which he attributes to the sixth century CE at the latest and to south India respectively, is in my view

conclusive; it also shows the breadth of his scholarship in the technical literature in Sanskrit. Combined with his expertise as a distinguished civil engineer, he was perhaps in an ideal position to bring this onerous task to a successful conclusion.

I need not enter into a description of the contents of *Nārada Śilpaśāstra*, which the Introduction aptly summarizes. I only wish to note how systematically it has been conceived and organized, with long discussions on the lay of the land, the qualities of different soils, the planning of boundaries and roads (which should have "the back of a tortoise" to let rainwater drain away, which some of our modern road-makers do not seem to have realized yet), the construction of bridges, causeways, reservoirs, check dams, dwellings of various kinds (royal and private, but also public ones such as courts, temples and theatres for various performing arts), concepts of town-planning applied to different kinds of cities, including fortified ones, and the different components of a house, with much thought given again to the flow of water, but also to ventilation, the various pieces of furniture and the religious elements of a temple or a private dwelling, including icons. The text, in other words, implies a sound knowledge of geology, water management, architecture, masonry and carpentry, art and sculpture, to use the English terms - all of which are implied in the single concept of *śilpaśāstra*.

Before a 21st century civil engineer dismisses the above as curiosities for the scholar or historian, he or she will do well to give the text a fair reading and, wherever possible, experimenting. After all, quite a few temples of over a thousand years of age are still standing in India; how long our skyscrapers will last is anybody's guess. The efficacy of some of the concepts and devices of traditional water management and architecture, to mention only these two fields, has long been acknowledged; an objective study of other achievements of ancient

civil engineering could yield some surprises. It is nobody's case that we should turn the clock back, but it is certain that from the angle of sustainability at least, if not also aesthetics, our "modern" concepts or urbanism and architecture would benefit from an open-minded scrutiny of texts of *śilpaśāstra* such as the one Prof. Iyengar and his collaborators have now put in our hands.

Michel Danino

Preface

The sheer beauty of the sculptures around the outer periphery of the Konark temple keeps one bewitched for a long time before one starts wondering what engineering methods had been followed to plan and execute such a grand edifice. Such was my experience when as Director of the Central Building Research Institute of CSIR I led a group of scientists in 1998 for conducting a geo-radar survey of the Konark temple site. Being interested in the history of science and engineering in India, I started collecting literature on the temple, when I came across the monograph *New Light on the Sun Temple of Konarka* by Boner, Śarma and Dās which includes four ancient manuscripts that contain the construction history of the 13th century temple, several engineering drawings on palm leafs and a diary that has kept partial account of the men, money and material at the project site. Sanskrit literature is rich in texts on architecture and iconography but writings that delineate the heritage of civil engineering history, such as the above one, are rare. It is quite likely large constructions should have followed similar methods of record keeping, but such manuscripts might not have survived the vagaries of nature.

Engineering heritage is not just about buildings and architecture, but includes construction of water resources for which the country is equally famous. Research scholars interested in indigenous methods of water management look for texts in Sanskrit on lakes and ponds. Thus, it was a pleasant surprise when a student from IIT Delhi approached me with the manuscript of *Nārada Śilpaśāstra* (NSS) and wanted to know whether the text has a chapter on dams and bridges. Indeed, the text had a chapter on check-dams but not on bridges. A quick perusal showed that the Sanskrit text in prose was highly technical and the language

not easy to follow. However, pondering over the text for nearly ten years convinced me that NSS is a text on the art and science of civil engineering as practised in ancient India.

The existence of the text had already been made known to the scholarly world by Prof. V. Raghavan in 1931, who had also pointed out the formidable difficulty in following the technical Sanskrit and sentence construction. Thus notwithstanding my enthusiasm to present the ancient text to my engineering colleagues, due to my limited exposure to Sanskrit grammar, I was hesitant to undertake the task without collaborating with a Sanskrit scholar. However, the invitation from Dr. Chenraj Roychand, the visionary educationist of Bangalore to join his newly founded Jain University, after my retirement from the Indian Institute of Science, proved to be a pleasant turning point. Dr. Roychand, fully appreciating the need for investigating Indian knowledge traditions, started the Centre for Ancient History and Culture in 2011, with Dr. S. Y. Wakankar, Deputy Director (Retd.), Oriental Institute Baroda joining me at the Centre. In the same year, we made a proposal on editing and translating the *Nārada Śilpaśāstra* and approached the IGNCA through its regional office in Bangalore for financial support, only to be stonewalled; the authorities never responded. Nevertheless, we earnestly started the study of the available manuscript comparing it with other allied literature to chalk out a way forward. But the archaic style of the text and significant differences in the exposition of the subject as compared with known texts such as the *Mānasāra*, the *Mayamata*, the *Samarāṅgaṇa-sūtradhāra* and others, made our progress too slow. Meanwhile, Dr. Wakankar due to personal reasons decided to move out of Bangalore in 2013. Fortunately, it was the time when IIT Gandhinagar was starting activities in the field of History of Science and Engineering and Dr. Wakankar found ready

support there for continuing the translation of the text. He collected two more manuscripts from Adyar and Mysore and started sending me translations based on the Baroda version, completing the first draft by June 2015. It is no exaggeration to say that the timely encouragement of IIT Gandhinagar sustained the project in its early stages. My special thanks are due to Prof. Sudhir K. Jain, Director, IIT Gandhinagar, himself a renowned civil engineer, for taking personal interest in promoting the study of NSS as a technical text in Sanskrit.

Lack of continuous support from a Sanskrit language specialist slowed down the work, till Dr. K.S. Kannan, Professor (Retd.) National College, Bangalore, was appointed by Jain University as faculty at the Centre. I am indebted to Dr.Roychand, President of the Jain University, for his encouragement to an activity which is too delicate to flourish without such personal support.

Prof. Kannan translated NSS independently keeping the Mysore version as the basis. Now, it was left to me to harmonize the two literal translations with the technical subject matter to prepare a new version. This in turn had to be acceptable to both of us for the correctness of the Sanskrit-English translation as well as the technical content. This has been no easy task, but after four cycles of back-and- forth modifications, followed by extensive personal discussions, the final version of the text and translation has been arrived at. In the Introduction where I have attempted to place the text in historical perspective, Prof. Kannan contributed a section on grammatical peculiarities of the language of the text. He also hyphenated the Sanskrit text for easy reading.

Prof. Michel Danino, Member, ICHR and Guest Professor, IIT Gandhinagar has been an ardent promoter and practitioner of indigenous knowledge systems. He took immense personal interest in the progress

of the present work from its inception. I could not have found a person as committed as he is, to study the history of science and engineering in India objectively avoiding extremes of ideologies. I am grateful to Prof. Danino for finding time to write a Foreword to the book.

Dr. P. Ramanujachar kindly helped in reading a palm leaf manuscript in Grantha script. Dr. Sowmya Krishnapur helped in searching for some manuscripts at Chennai. It is my pleasant duty to thank these two scholars for their help. Smt. H.R. Meera, developed a searchable version of the text from the manuscripts, prepared a preliminary version of word index, collected variant readings and also helped in preparing soft copies of the various handwritten versions of the translations. Her cooperation is thankfully acknowledged.

Thanks are due to the authorities of the oriental libraries at Adyar, Baroda and Mysore for making available copies of manuscripts of the present text. Finally, I profusely thank the staff of the Jain University Press for bringing out the book with attractive get up.

I hope the present text of the *Nārada Śilpaśāstra* will be of interest not only to architects, engineers and historians but also to traditional and modern scholars studying Indic knowledge systems to appreciate how the art and science of town planning, water resources and large-size building construction evolved in ancient India.

R. N. Iyengar
Centre for Ancient History and Culture
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Abbreviations

A	Adyar Manuscript of NSS
Ai. Br	Aitareya Brāhmaṇa
AVP	Atharvaveda Pariśiṣṭa
B	Baroda Manuscript of NSS
BCE	Before Common Era (B.C.)
BNS	Bharata's Nāṭyaśāstra
Br. Pu	Brahmāṇda Purāṇa
BS	Bṛhat Saṁhitā
CE	Common Era (A.D.)
Ch	Chapter
KAS	Kauṭilya's Arthaśāstra
Kau. Br	Kauṣītaki Brāhmaṇa
L	Lesson
M	Mysore Manuscript of NSS
MB	Mahābhārata
MM	Mayamata
MS	Mānasāra
NSS	Nārada Śilpaśāstra
PS	Prajāpatisūtra
RV	Ṛgveda
SKA	Śārdūlakarṇāvadāna
v	Verse
VGJ	Vṛddhagārgīya Jyotiṣa
VK	Vaijayantī Kośa of Yādavaprakāśa
Vs	Vāstuśāstra
VVS	Viśvakarma Vāstuśāstra

Contents

India has a rich and ancient tradition of building cities, monuments, towers, dams, bridges, reservoirs, step-wells and other civic infrastructure besides beautiful temples and palaces. Some of the present day highways are aligned on ancient tracts that were first laid several centuries ago. There are several ancient Sanskrit texts known as either *vāstuśāstra* or *śilpaśāstra* that describe some aspects of residential buildings, temples and other structures. The present text, attributed to the authorship of Nārada, the legendary sage and polymath, is a *vāstuśāstra* text, although traditionally the manuscripts are titled *Nārada Śilpaśāstra*. This text, in terse technical Sanskrit prose describes site selection, planning of villages and cities, construction of roads, dams, lakes, foundation, basement, and super structure of private and public buildings including marriage halls, art galleries, theatres and temples. Internal evidences point out that in its present form, this text originated at a time when weekdays were not in vogue, but acquired additional material at a later period and fixed in South India around 6th century CE.

Prof. R.N. Iyengar himself a renowned Civil Engineer, helped by two reputed Sanskrit scholars, has for the first time brought out this unique Sanskrit text on the theory and practice of Architectural Civil Engineering in ancient India with Introduction, translation, notes and figures.

"……The efforts… bound to elicit much scholarly interest in India and abroad. This critical edition, based on three manuscripts, comes with a careful editorial apparatus, which includes … Prof. Iyengar's meticulous discussion of the date and provenance of the text, which he attributes to the sixth century CE at the latest and to south India respectively, is in my view conclusive; it also shows the breadth of his scholarship in the technical literature in Sanskrit...it is certain that from the angle of sustainability at least, if not also aesthetics, our "modern" concepts or urbanism and architecture would benefit from an open-minded scrutiny of texts… such as the one Prof. Iyengar and his collaborators have now put in our hands…."

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